



Hormone Imbalance

Dr. Sukhdev Singh

Principal, SGHS Khalsa College, Panjokhra Sahib, Ambala, Haryana, India

Abstract

Hormones are used to communicate between organs and tissues for physiological regulation and behavioral activities, such as digestion, metabolism, respiration, tissue function, sensory perception, sleep, excretion, lactation, stress, growth and development, movement, reproduction, and mood. Hormones affect distant cells by binding to specific receptor proteins in the target cell resulting in a change in cell function. When a hormone binds to the receptor, it results in the activation of a signal transduction pathway. This may lead to cell type-specific responses that include rapid non-genomic effects or slower genomic responses where the hormones acting through their receptors activate gene transcription resulting in increased expression of target proteins. Amino acid-based hormones (amines and peptide or protein hormones) are water-soluble and act on the surface of target cells via second messengers; steroid hormones, being lipid-soluble, move through the plasma membranes of target cells (both cytoplasmic and nuclear) to act within their nuclei.

Keywords: hormones, metabolism, proteins, amino

Introduction

A hormone (from the Greek participle “ὄρμῶν”, "to set in motion, urge on") is any member of a class of signaling molecules produced by glands in multicellular organisms that are transported by the circulatory system to target distant organs to regulate physiology and behaviour. Hormones have diverse chemical structures, mainly of 3 classes: eicosanoids, steroids, and amino acid/protein derivatives (amines, peptides, and proteins). The glands that secrete hormones comprise the endocrine signaling system. The term hormone is sometimes extended to include chemicals produced by cells that affect the same cell (autocrine or intracrine signalling) or nearby cells (paracrine signalling).

Hormone secretion may occur in many tissues. Endocrine glands are the cardinal example, but specialized cells in various other organs also secrete hormones. Hormone secretion occurs in response to specific biochemical signals from a wide range of regulatory systems. For instance, serum calcium concentration affects parathyroid hormone synthesis; blood sugar (serum glucose concentration) affects insulin synthesis; and because the outputs of the stomach and exocrine pancreas (the amounts of gastric juice and pancreatic juice) become the input of the small intestine, the small intestine secretes hormones to stimulate or inhibit the stomach and pancreas based on how busy it is. Regulation of hormone synthesis of gonadal hormones, adrenocortical hormones, and thyroid hormones is often dependent on complex sets of direct influence and feedback interactions involving the hypothalamic-pituitary-adrenal (HPA), -gonadal (HPG), and -thyroid (HPT) axes.

Upon secretion, certain hormones, including protein hormones and catecholamines, are water-soluble and are thus readily transported through the circulatory system. Other hormones, including steroid and thyroid hormones, are lipid-soluble; to

allow for their widespread distribution, these hormones must bond to carrier plasma glycoproteins (e.g., thyroxine-binding globulin (TBG)) to form ligand-protein complexes. Some hormones are completely active when released into the bloodstream (as is the case for insulin and growth hormones), while others are prohormones that must be activated in specific cells through a series of activation steps that are commonly highly regulated. The endocrine system secretes hormones directly into the bloodstream typically into fenestrated capillaries, whereas the exocrine system secretes its hormones indirectly using ducts. Hormones with paracrine function diffuse through the interstitial spaces to nearby target tissue.

A hormonal imbalance is a malfunction of one or more hormones in the body. Each hormone has a different effect on the body, and all hormonal imbalances are different. A hormonal imbalance may be asymptomatic, or inconsequential. However, it can also be the cause of many diseases, mild or severe, such as thyroid disorders, diabetes, acne, obesity, or infertility. Treatment includes restoring the normal order of these hormones.

Hormonal signaling involves the following steps

1. Biosynthesis of a particular hormone in a particular tissue
2. Storage and secretion of the hormone
3. Transport of the hormone to the target cell(s)
4. Recognition of the hormone by an associated cell membrane or intracellular receptor protein
5. Relay and amplification of the received hormonal signal via a signal transduction process: This then leads to a cellular response. The reaction of the target cells may then be recognized by the original hormone-producing cells, leading to a down-regulation in hormone production. This is an example of a homeostatic negative

feedback loop.

6. Breakdown of the hormone.

Regulations

Hormone cells are typically of a specialized cell type, residing within a particular endocrine gland, such as the thyroid gland, ovaries, and testes. Hormones exit their cell of origin via exocytosis or another means of membrane transport. The hierarchical model is an oversimplification of the hormonal signaling process. Cellular recipients of a particular hormonal signal may be one of several cell types that reside within a number of different tissues, as is the case for insulin, which triggers a diverse range of systemic physiological effects. Different tissue types may also respond differently to the same hormonal signal.

The rate of hormone biosynthesis and secretion is often regulated by a homeostatic negative feedback control mechanism. Such a mechanism depends on factors that influence the metabolism and excretion of hormones. Thus, higher hormone concentration alone cannot trigger the negative feedback mechanism. Negative feedback must be triggered by overproduction of an "effect" of the hormone.

Hormone secretion can be stimulated and inhibited by

- Other hormones (*stimulating-* or *releasing* -hormones)
- Plasma concentrations of ions or nutrients, as well as binding globulins
- Neurons and mental activity
- Environmental changes, e.g., of light or temperature

One special group of hormones is the tropic hormones that stimulate the hormone production of other endocrine glands. For example, thyroid-stimulating hormone (TSH) causes growth and increased activity of another endocrine gland, the thyroid, which increases output of thyroid hormones.

To release active hormones quickly into the circulation, hormone biosynthetic cells may produce and store biologically inactive hormones in the form of pre- or prohormones. These can then be quickly converted into their active hormone form in response to a particular stimulus.

Eicosanoids are considered to act as local hormones. They are considered to be "local" because they possess specific effects on target cells close to their site of formation. They also have a rapid degradation cycle, making sure they do not reach distal sites within the body.

Effects

Hormones have the following effects on the body

- Stimulation or inhibition of growth
- Wake-sleep cycle and other circadian rhythms
- Mood swings
- Induction or suppression of apoptosis (programmed cell death)
- Activation or inhibition of the immune system
- Regulation of metabolism
- Preparation of the body for mating, fighting, fleeing, and other activity
- Preparation of the body for a new phase of life, such as puberty, parenting, and menopause
- Control of the reproductive cycle

- Hunger cravings

Causes of hormone imbalance

Hormonal balance is vital to a healthy, cancer-free mind and body, but can be disrupted in many ways. Hormone fluctuations occur naturally, such as in puberty, menopause and perimenopause. Hormone imbalance may also be caused by toxins or an unbalanced lifestyle. Understanding the causes of hormone imbalance empowers us to prevent them, and at the same time, feel better, think better, and better prevent breast cancer.

Age, Menopause and Hormone Imbalance

As reproductive functions play out over time hormone levels take a plunge, triggering the onset of menopause and common hormone imbalances associated with the change of life. Unhealthy habits can muddy the midlife picture by speeding the pace of hormonal decline and premature aging.

Conclusion

Today we talk about the the lifestyle and diet changes you have to make in order to correct your hormones:

Do's

1. To keep the metabolism healthy, drink at least 6–8 glasses of water every day.
2. Go for organic products. Say a big no to refined carbohydrates by not consuming processed and packaged food.
3. Get a sleep of 8 hours to de-stress yourself, and indulge in activities that relaxes you.
4. Take deep breaths or indulge in deep breathing exercise for fifteen minutes. It allows decreasing stress hormones and the body to function normally.
5. Focus on nutrient-rich food and take meals at fixed time of the day. Go for green vegetables like asparagus, broccoli, spinach, collard greens, cabbage, cucumbers, kale, cilantro, etc.
6. You can try for a detox bath with plenty of Epsom salts. It provides magnesium known for balancing hormones. The most antiseptic of all the spices, turmeric, balances hormones along with curing other ailments.

Don'ts

1. Give up unhealthy habits like smoking, drinking that cause hormonal imbalance.
2. Avoid intake of artificial hormones without consulting a doctor.
3. Give up products containing caffeine as it increases cortisol levels that reduce thyroid function.
4. Limit the use of plastic as it can affect your hormonal level.
5. Remove vegetable oil from your diet. A large quantity of omega-6 fatty acid in it may disturb the hormone balance.
6. Boycott soy products as they play havoc with hormone balance.

References

1. Neave N. Hormones and behaviour: a psychological approach. Cambridge: Cambridge Univ. Press. ISBN 978-0521692014. Lay summary – Project Muse, 2008.
2. Hormones. Medline Plus. U.S. National Library of

Medicine.

3. Nussey S, Whitehead S. Endocrinology: an integrated approach. Oxford: Bios Scientific Publ, 2001. ISBN 978-1-85996-252-7.
4. Eicosanoids. www.rpi.edu. Retrieved, 2017-02-08. <https://en.wikipedia.org/wiki/Hormone>
5. <http://womeninbalance.org/seventh-woman/causes/>
6. <http://health.ccm.net/faq/2204-hormonal-imbalance-definition>
7. <https://greenworldlagos.wordpress.com/2017/08/04/hormonal-imbalance-conclusion/>